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NOTE BY THE SECRETARY-GENERAL

The Secretary-General has the honour to transmit to the members of the Security Council the attached communication which he has received from the Director General of the International Atomic Energy Agency (IAEA).

Annex

Letter dated 28 January 1992 from the Director General of the International Atomic Energy Agency addressed to the Secretary-General

Please find attached the report of the ninth IAEA Inspection in Iraq under Security Council resolution 687 (1991). You may deem it appropriate to transmit the report to the members of the Security Council. I remain, of course, available with the Chief Inspector, Professor Maurizio Zifferero for any consultations you or the Council may wish to have.

(Signed) Hans BLIX

Enclosure

REPORT ON THE NINTH IAEA ON-SITE INSPECTION IN IRAQ

UNDER SECURITY COUNCIL RESOLUTION 687 (1991)

11 - 14 January 1992

SALIENT POINTS

- The main objective of the ninth IAEA on-site inspection was to verify recent information obtained from Governments of Member States, and in particular from the Government of Germany, about the procurement of large quantities of stock materials and components needed in the manufacturing of gas centrifuge machines for the production of enriched uranium.

  The materials and components in question included purpose-designed aluminium alloy extrusions used in the production of centrifuge vacuum housings and molecular pumps, and ferrite magnets used in the stators of the centrifuge motors. The quantities involved, which would have been sufficient for the manufacture of the basic static parts of several thousand centrifuges, had not been included in any previous Iraqi declaration.

- This information was discussed with the Iraqi Minister of State for Foreign Affairs in the presence of technical experts from both sides. Subsequent to the discussion, the Iraqi authorities acknowledged the procurement of these materials and components, but stated that all had been destroyed or "rendered harmless" by melting and crushing before the beginning of nuclear inspections in Iraq under resolution 687.

- Further, they acknowledged the procurement of 100 tons of the special high-tensile-strength steel (maraging steel) needed for producing several thousand centrifuge rotors and rotor internal fittings and the procurement of a few thousand aluminium forgings for the vacuum housing top and bottom flanges.

  The Iraqi authorities explained that in this case also the stockpile of maraging steel and aluminium forgings had been "rendered harmless" by melting before the start of the nuclear inspections and offered to present to the team all the materials which they had procured at the location where they were currently stored after being rendered harmless.

- The inspection team verified and sampled the melted maraging steel stockpile and the powder resulting from the crushing of the ferrite magnets, leaving for the next inspection the remaining verifications. A rough estimate of the quantities made on-site appears consistent with the quantities procured. Full verification must await the results of sample analyses and a more accurate assessment of mass.

- The results of this inspection have resolved a number of inconsistencies regarding the Iraqi centrifuge programme remaining from previous inspections. In the opinion of the experts who took part in the nuclear inspection, Iraq had not reached the point where it could start centrifuge production on a sizeable scale, but given time, it would have been successful.

- However, the centrifuge enrichment programme had reached the point where the materials necessary for certain key centrifuge components had been identified, and these materials were being procured as opportunities presented themselves even though the final design had not been completely fixed nor the manufacturing process fully implemented. The operation of any production-oriented centrifuge cascade would have required the procurement of large numbers of finished components, but the nuclear inspection teams have found no evidence of this.

- Initiatives taken by the German Government have greatly assisted the ongoing inspection effort as it relates to the Iraqi centrifuge enrichment programme.

INTRODUCTION

1. This report summarizes the findings of the ninth inspection carried out by the IAEA in Iraq under Security Council resolution 687 (1991) with the assistance and co-operation of the Special Commission of the United Nations. The inspection took place from 11 to 14 January 1992 and was headed by Mr. Maurizio Zifferero of the IAEA as Chief Inspector. The team consisted of 6 inspectors and 8 supporting staff; it comprised 8 nationalities.

   The objectives of the inspection were mainly to:

   - verify information, recently received from the German Government, concerning the procurement by Iraq of stock materials and components needed in the manufacturing of gas centrifuges for the production of enriched uranium.

   - visit a few previously inspected sites for follow-up actions in order to verify the existence of some machine-tools which might have been associated with the centrifuge enrichment programme.

2. A meeting was held at the Ministry of Foreign Affairs on Sunday, 12 January. The Iraqi delegation was headed by Mr. Muhammad Said al-Sahhaf, Minister of State for Foreign Affairs, and included Mr. Human al-Ghaffar, the Chairman of the Iraqi Atomic Energy Commission (IAEC), Mr. Ibrahim al-Hajjaj, the leader of the Iraqi team for nuclear inspections under resolution 687, and Mr. Abd al-Qadir Ahmad, former Director of the Tuwaitha Nuclear Research Centre and now advisor to the IAEC. The Agency's Chief Inspector gave the Minister a copy of the information recently received from the German Government (see Annex 1) concerning the procurement by Iraq of large quantities of stock materials and components, the nature of which left no doubt about their future utilization in the manufacturing of a large number of centrifuges for producing enriched uranium. In the light of this evidence, the Iraqi authorities were invited to come forward with a comprehensive statement about their procurement of stock materials, components and equipment related to their centrifuge programme.

On the following day a technical meeting was held at the Tuwaitha Nuclear Research Centre. The Iraqi team acknowledged the procurement of the materials and components indicated by the German Government. They further acknowledged the import of additional stock materials including maraging steel and items described later in this report. The Iraqi authorities explained that the entire stockpile of materials and components had been destroyed or "rendered harmless" by melting and crushing before the beginning of nuclear inspections in Iraq under resolution 687. The inspection team was given the possibility to verify the materials and components at the site to which they had been moved for destruction.

3. A site already inspected during the fourth IAEA mission, in the proximity of the Baghdad North Bridge, was thoroughly re-inspected at the request of the Special Commission. The results of the fourth inspection were confirmed in the sense that no immediate evidence of a connection with nuclear activities was found.

4. At the end of the inspection, the team was given a set of documents including written replies to questions asked during the ninth and previous inspections and a set of tables containing a list of items to be reported by Iraq to the Agency under resolution 715. The list of documents received or transmitted in the course of the inspection is contained in Annex 2.

THE GAS CENTRIFUGE URANIUM ENRICHMENT PROGRAMME

5. The detailed analysis of centrifuge components removed from Iraq during the seventh and eighth inspections and new data on foreign procurements by Iraq (acknowledged and added to by Iraqi authorities during the ninth inspection) have resulted in a more consistent picture of the Iraqi centrifuge programme. The new data on foreign procurements were provided by IAEA Member States working with the Action Team and, in two significant instances, by Iraq.

6. The Iraqi centrifuge design conforms substantially to early west European designs. However, no component is identical in design; all showed evidence of intelligent adaptation and development based on sound principles. A number of capable scientists and engineers were involved in the Iraqi centrifuge development effort, but it is unlikely that they were able to make the observed design modifications without

outside help. The Iraqi authorities acknowledged "advice from abroad", but they were clearly trying to minimize the extent of foreign involvement. A centrifuge constructed from components found in Iraq, but manufactured to a higher quality standard, would have a separative power greater than that declared by Iraq.

7. Investigations of Iraqi procurements, with the close co-operation of Member State Governments, have become an integral part of the overall inspection effort. Among the data obtained is information from the German Government indicating that large quantities of stock materials intended for the Iraqi centrifuge manufacturing programme had been delivered to Iraq during the period January - May 1990. These stock materials included:

- 300 tonnes of aluminium alloy (AlMgSi 1 F31) tube extrusions for the manufacture of vacuum housings (enough for approximately 2,500 housings). An order for an additional 310 tonnes was stopped by the embargo.

- 84 tonnes of aluminium alloy (AlMgSiPb F28) tube extrusions for the manufacture of molecular pumps (enough for 6,000 pumps);

- 240,000 ferrite magnet spacers (24 per centrifuge stator) and 10,000 soft iron ring band cores (providing material for the manufacture of 10,000 stators for centrifuge motors).

During the ninth inspection, the Iraqi authorities confirmed the receipt of these materials and, in addition, declared the procurement of:

- 100 tonnes of 350-grade maraging steel (material sufficient for approximately 5,000 centrifuges employing maraging steel rotors, end caps and baffles);

- Aluminium forgings sufficient for the manufacture of several thousand top and bottom flanges for the centrifuge vacuum housings.

A schematic showing the various centrifuge components referred to above is presented as Figure 1. The estimate of the numbers of centrifuge components that could have been manufactured from the stated amounts of material implies no

FIGURE 1. CENTRIFUGE COMPONENTS

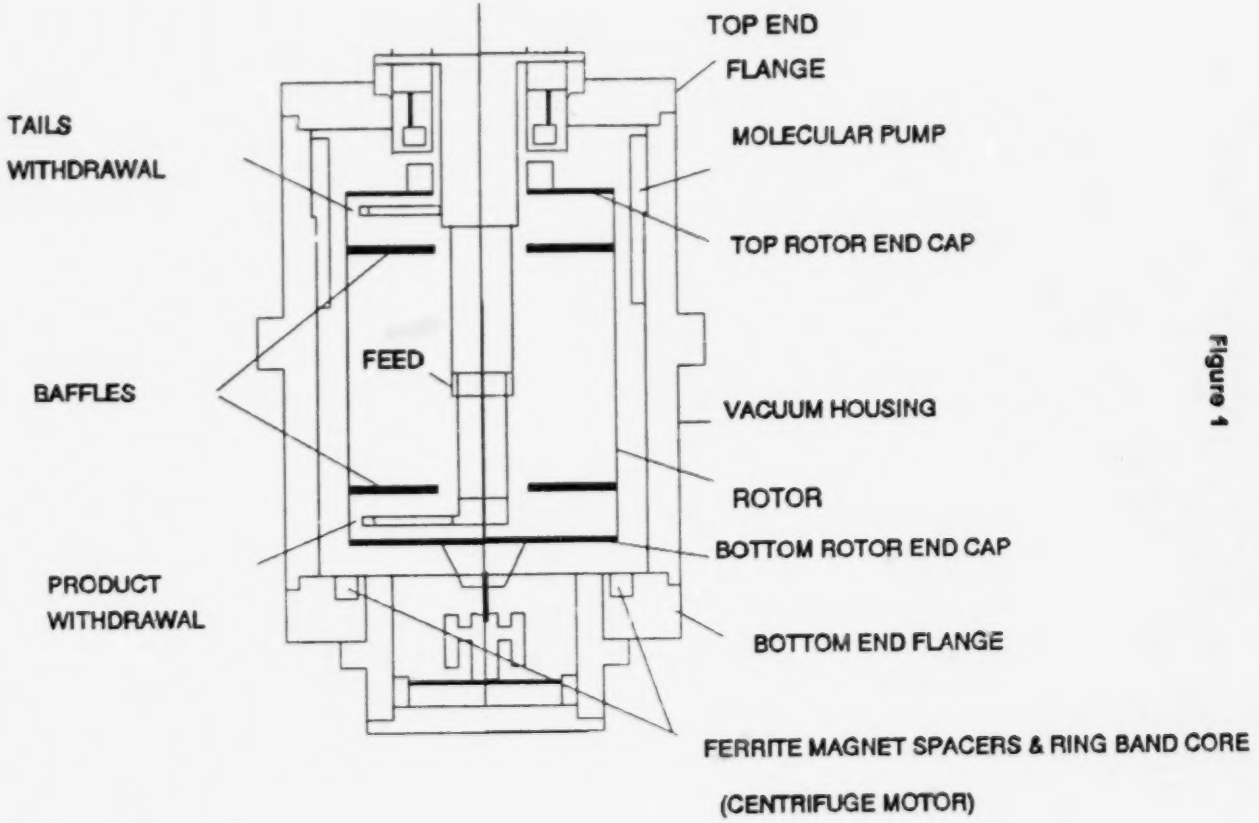

Figure 1

difficulty in meeting the required specifications. A reject rate in the range of 50% for some components was estimated by the Iraqi experts. This reasonably can be expected while the manufacturing process is being implemented.

8. The acquisition of such large quantities of stock materials indicates that Iraq was planning for a much larger and more rapid centrifuge deployment than previously declared. The Iraqi authorities acknowledged this, but argued that there was no contradiction between the very large procurements and the centrifuge development and deployment schedule given to the third and fourth inspection teams; this schedule shows a 500- machine cascade beginning to operate early in 1996. They indicated that the material specifications for important components had been set by mid-1989, but that the final design of the centrifuge was not fixed at the time work stopped because of the Gulf War. Faced with tighter and tighter export controls, they proceeded with the large procurements as opportunities presented themselves, even though they had no immediate plans for the materials in the quantities ordered. Their strategy was to buy whenever there was an opportunity and simply run the risk that some material might not be used.

9. The Iraqi authorities, explaining this material had not been declared, stated that immediately after the Gulf War a political decision had been taken to dismantle and destroy the nuclear programme. In line with this decision, all centrifuge-related materials, equipment and documents were turned over to the Iraqi military for destruction. The actions taken to destroy the materials in question were described as follows:

- The 100 tonnes of 350-grade maraging steel rods and tubes were taken (except for the 3.25 tonnes previously declared to the inspection teams) to the State Establishment for Mechanical Works (a foundry near Iskandariya), melted and poured into "ingots".

- The ferrite magnets and ring band cores were taken to the same establishment. The ferrite magnets were crushed into powder and the ring band cores were melted.

- Aluminium alloys (more than 450 tonnes) in the form of tube extrusions for the manufacture of vacuum housings and molecular pumps and in the form of forgings for the manufacture of end flanges were taken to the Ur Establishment (an aluminium smelter at Al Nassiriya) and melted together.

The Iraqi authorities explained that these materials had been destroyed before the beginning of IAEA inspections, and destroyed in a manner that rendered them useless for centrifuges (e.g. the maraging steel was no longer maraging). Their position was that technically they no longer had maraging steel, special aluminium alloys etc. and, under their interpretation of resolution 687 and later Security Council resolutions, they were not obliged to declare them.

10. Obviously this position can be debated, particularly in view of past Iraqi attempts to hide the true nature and extent of Iraq's nuclear programme. However, justifiable or not, this position suggests that the inspection teams will continue to have difficulty in uncovering and verifying the complete Iraqi programme. The destruction process which began in the immediate aftermath of the Gulf War was, according to the Iraqi authorities, stopped only at the time of the high-level visit by Messrs. Ekéus, Blix and Akashi on 29 June 1991 during the second inspection. The Iraqi statement was that the only centrifuge-related equipment and materials declared by Iraq and verified by inspection teams prior to the ninth inspection were materials and equipment that had not been destroyed as of the end of June 1991. As more procurement data become available, there will probably continue to be mismatches between quantities of materials and equipment delivered to Iraq and quantities declared to and verified by inspection teams. Furthermore, even if the Iraqi position could be accepted, it has not been applied in a consistent manner.

11. The quantities of stock materials were declared by Iraq to be available for inspection at the sites to which they had been taken for destruction. On the last day of the ninth inspection the team went to the State Establishment for Mechanical Works at Iskandariya in order to inspect the melt of the maraging steel and ferrite magnet powder. The team was shown a large pile of flat, irregularly shaped "ingots" in an outside storage area. Samples were taken for the purpose of confirming that the chemical composition is that of maraging steel and that the melting has indeed rendered the material useless for centrifuges. One ingot was selected at random and

weighed (740 kg). This together with a rough count of the number of ingots led to an estimate of the total mass that is reasonably consistent with the Iraqi declaration. Pending confirmation of the chemical composition of the material at Iskandariya, it now appears that the 100 tonnes of maraging steel is generally accounted for - i.e. i) the 1.5 tonnes of maraging steel centrifuge components (end caps and baffles) stopped en route from Switzerland to Iraq at Frankfurt Airport, ii) the maraging steel components declared and inspected at the Ash Shakyli warehouse near Al Tuwaitha and iii) the material seen by the ninth inspection team at Iskandariya. The team was also shown a steel box containing approximately 100 litres of a ceramic powder which, according to the Iraqi authorities, was all that remained of the ferrite magnets; samples were taken to confirm this. More precise assessment of the material stored at Iskandariya and examination of the aluminium melted at Al Nassiriya will be on the agenda of the next inspection.

12. The official Iraqi declaration regarding the number of carbon fibre rotors had been revised upwards from 10 to 20. Twelve of the rotors were seen by inspectors - five were removed from Iraq for analysis and 7 were destroyed during the seventh inspection. Iraq claims that 8 carbon rotors were broken during attempts to install end caps. This is plausible, as an independent assessment of centrifuge components removed from Iraq came to the conclusion that the maraging steel end caps were over-sized vis-a-vis the carbon rotors. The source of the carbon rotors remains unknown. Analysis of them has identified the company which produced the carbon filaments. However, it has been determined that this company has only had one customer for the particular grades of carbon fibre in question and that the customer was not Iraq. Further, the construction of the helix layer is different between at least two of the rotors removed from Iraq and different still from the construction used in Europe. The Iraqi authorities stated that they had procured 20 rotors from a "dealer" and that they had had nothing to do with material and construction specifications. They had chosen to purchase the carbon rotors to support the mechanical endurance and separation testing of single machines as they worked to install the maraging steel rotor line. Immediately before the ninth inspection, the Action Team received a report that three filament winding machines had been delivered to Iraq. The Special Commission indicated that a missile inspection team had seen filament winding machines at the Dhu Al Fiqar factory near Falluja. These machines were inspected. There are three filament winding machines at this location, but expert opinion is that they do not possess sufficient capability for the manufacture of carbon fibre rotors.

As usual, manufacture-related information had been removed from the machines. Action to ascertain whether the machines seen at Dhu Al Fiqar correspond to those reported to have been delivered to Iraq will be taken.

13. The Iraqi plans for the installation of centrifuge manufacturing equipment at Al Furat apparently included five CNC machines in addition to the equipment identified in the seventh and eighth inspection reports. Evidence available to the IAEA inspection team indicates that these five machines were being procured for the manufacture of maraging steel end caps and baffles. The procurement included the demonstration by the manufacturer that the machines were capable of producing the maraging steel pieces to the required specifications. Iraq supplied the manufacturer with maraging steel (presumably from the stock of 100 tonnes described earlier). The return shipment to Iraq of the finished demonstration pieces was intercepted and stopped by German authorities at Frankfurt airport. The full Iraqi order to the European manufacturer was for 15 CNC machines. The five machines referred to above were never delivered. The ten machines that were delivered are, according to Iraqi statements, the machines currently under IAEA seal at the Badr State Establishment. These machines show little signs of use and the analysis of metal turnings taken from some of these machines does not provide evidence that they were used for the manufacture of centrifuge components. It has not been confirmed that the ten machines at Badr are the ten machines originally ordered for the centrifuge programme.

14. Further analysis of the maraging steel rotors, mandrel collar and flow-forming rollers supports Iraqi declarations regarding the extent of use of the flow-forming machine. One of the flow-forming rollers rendered harmless during the eighth mission was removed from Iraq by the ninth team in order to confirm a correspondence between the rollers and the maraging steel rotors. The ninth team also inspected nine flow-forming machines declared by Iraq to have been used in the production of 122-mm and 262-mm rocket bodies. Seven of these machines are installed at the Nasr Establishment at Taji and two are being stored at a subsidiary establishment at Schäula. Eight of the machines are identical, and capable of flow-forming diameters in the range 60-400 mm. The ninth machine (at Schäula) is much larger, and is capable of flow-forming diameters in the range 80-600 mm. All mandrels and other fixtures observed are consistent with Iraqi statements. If the machines were fitted with the appropriate mandrels, rollers, etc., then all machines inspected could have been

used to produce steel centrifuge rotors. The Iraqi authorities reiterated that they had only one mandrel for centrifuge rotors. Most of the machines suffered substantial damage during the Gulf War.

15. The additional five CNC machines referred to in para. 13 above, which are now stated to have been intended for installation at Al Furat, provides a larger potential production capacity than originally estimated by experts. The layout of the Al Furat complex with the planned utilization (as identified by Iraq) is described in Figure 2. The buildings designated as B01, B02 and B03 were far from completion when work stopped.

OTHER ACTIVITIES

16. The ninth inspection team conducted a short-notice inspection of the Rashdiya complex, located in the proximity of Baghdad North Bridge. The complex had been designated and inspected by the fourth inspection team. It was constructed in the early 1980s as a project of the Ministry of Agriculture for research and development in water irrigation technology. According to supplied information, the research for which the facility was designed was terminated for lack of success and the entire complex was taken over in 1988 by the Ministry of Industry and Minerals. They partitioned the facility and established an "Engineering Design Centre" (occupying what had been the administration and R & D buildings) in the northern part of the site and were attempting to establish a paper mill/vocational training centre (under the auspices of the Department of Forestry) in the southern portion. The site was physically divided by a wall, the only connection between the two parts being through the main entrances set at two points along the west side of the complex.

17. The Engineering Design Centre was stated to have a staff of 250 technical and administrative personnel. Their work was described as having generally to do with water treatment and water quality, but since the end of the Gulf War most of the staff have been assigned to projects associated with the reconstruction effort. Most offices and laboratories were empty and showed no signs of recent occupancy. The few laboratories where there was activity seemed to be involved in work consistent with Iraqi statements. One typical feature was the complete absence of paper records or reports. The Director of the Centre was unable to produce a single piece of paper related to its projects. His explanation was that all records and reports were

FIGURE 2. THE AL FURAT CENTRIFUGE PRODUCTION COMPLEX

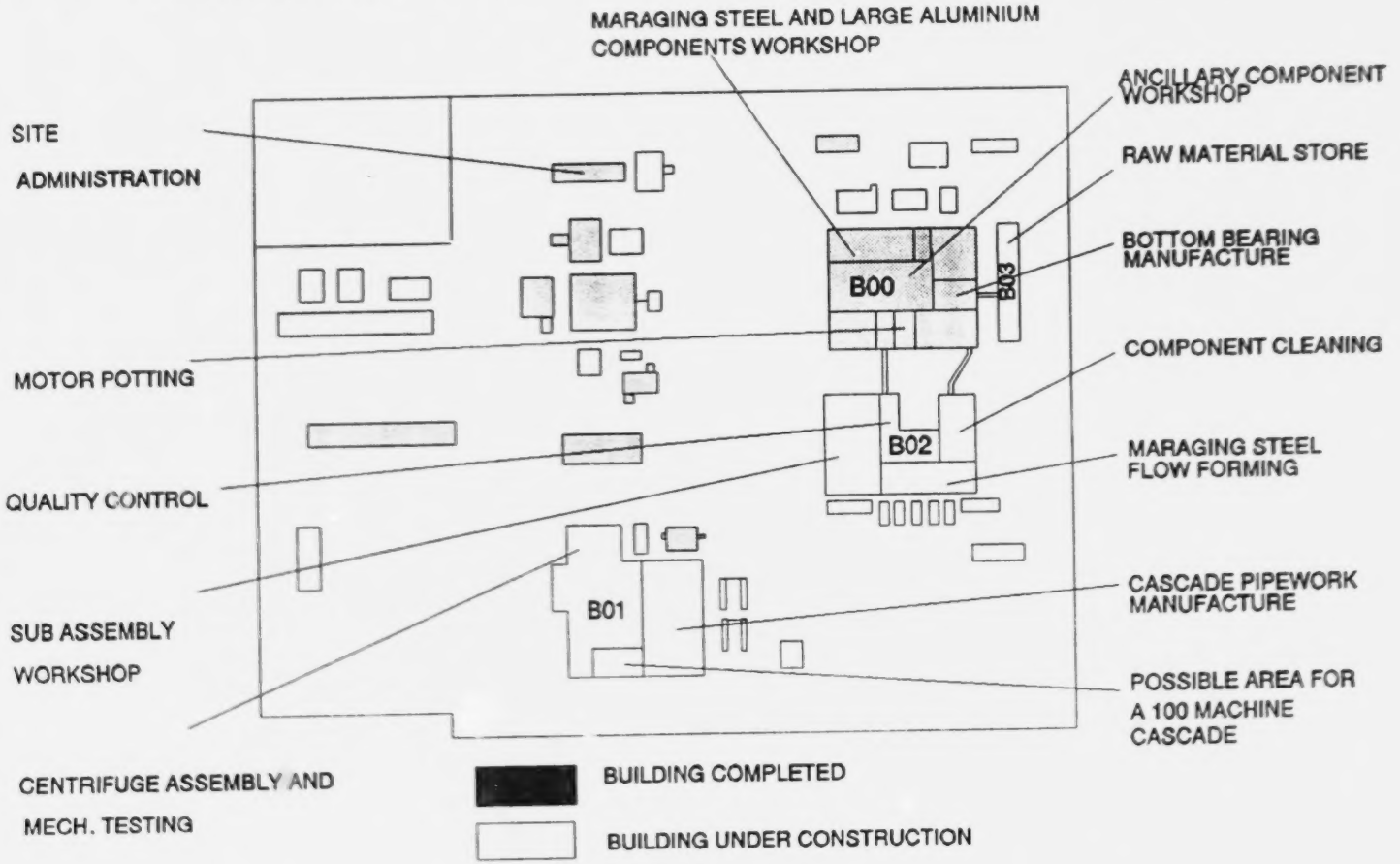

Figure 2

.../

maintained at the field locations where the staff were working or at the Ministry. The Director repeatedly stated that the Centre had never performed any nuclear-related work and that he and his staff had no knowledge of the Petrochemical-3 (PC-3) project.

18. In the southern part of the complex, there are a large main building, settling tanks, a water pump house and three buildings in the early stages of construction. The southernmost area is occupied by a deserted construction camp. The main building has a huge, high-bay hall (approximately 6,000 m^2) and a suite of offices along the eastern side. The building is being used to store fertilizers, pesticides and seeds. At the time of the inspection, about 10% of the floor area was being used for this purpose. The rest was empty. The facility has a staff of 3-4 people, who essentially serve as caretakers. It was explained that the main building and the three under construction were intended to be used for wood/paper products R & D and a vocational training centre. Blueprints for the buildings under construction found in a deserted office have titles that appear to confirm this. Construction work stopped at the onset of the Gulf War. At one time, the main building was connected to the R & D building by a first-floor walkway, which has since been walled off. The building has a huge water supply, which Iraqi statements linked to the defunct hydrology project. The north-west corner of the building contains a small room (100 m^2) which had been freshly painted and which had a new concrete floor. The manager's explanation was that this room was being prepared for the storage of herbicides that needed to be kept separate from the materials stored in the main hall. There was no physical evidence or other signs of recent modifications which might suggest that this facility served some other purpose than what was declared. A large number of samples were taken.

Appendix I

Letter dated 17 January 1992 from the Alternate to the Resident Representative of Germany to the Office of the United Nations and to the other International Organizations, Vienna, addressed to the Leader of the IAEA Action Team Iraq, established pursuant to Security Council resolution 687 (1991)

With reference to the Action Team's findings on the Iraq centrifuge programme as contained in the reports on the 6th and 7th IAEA on-site inspection, my Government has authorized me to make the following additional information on supplies from Germany to Iraq for the centrifuge programme available to you:

240.000 ferrite shaped parts for centrifuge stators and 10.000 pieces of ring sheet material were supplied, in several shipments, to the State Electrical Industries Establishment, Baghdad between January and May 1990, by a German company. A die-casting machine for the manufacture of coil rings for stators was also supplied.

The volume of these supplies may allow some conclusion on the scope and size of the Iraqi centrifuge programme.

Supplementary documentation and drawings are available for examination by experts of the special commission and the IAEA Action Team at the Federal Foreign Office in Bonn, Germany.

(Signed) Klaus UNGER
Alternate to the Resident Representative

Appendix II

List of documents received or transmitted during the Ninth Inspection

920113	Letter from Maurizio Zifferero to Al Hajjaj requesting information on German exports in the centrifuge project.
920114	Letter from Al Hajjaj to Maurizio Zifferero giving information on German procurement on centrifuges.
920114	Letter from Al Hajjaj to Maurizio Zifferero giving details on the request of radiopharmaceuticals.
920114	Letter from Al Hajjaj to Dimitri Perricos giving information on the movements of IAEC personnel to the "new site" of Al Atheer.
920114	Letter from Al Hajjaj to Dimitri Perricos addressing questions raised in writing on 911116 and 911118 on i) staff and equipment transfer to Al-Atheer from Tuwaitha and ii) clarifications regarding activities of Group 4 of PC-3.
920114	Long table of items as requested in Annex 3 of the long term monitoring plan to complete earlier submission and revised list of radioactive sources. They will provide also an English version and transmit it officially to the UNSG and Dr. Blix.